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Total Number of Pages in This Submission

34

Application Number	10/799,413
Filing Date	03/12/2004
First Named Inventor	Angela Hui
Art Unit	2814
Examiner Name	Anh D. Mai
Attorney Docket Number	AF01158

ENCLOSURES (Check all that apply)

<input checked="" type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Reply to Missing Parts/ Incomplete Application <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation <input type="checkbox"/> Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input checked="" type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): Return Postcard
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Winstead Sechrest & Minick P.C.		
Signature			
Printed name	Robert A. Voigt, Jr.		
Date	01/24/2006	Reg. No.	47,159

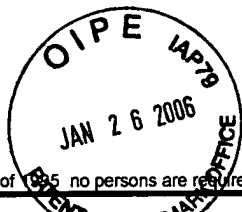
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Typed or printed name	Toni Stanley	Date	01/24/2006

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PTO/SB/17 (11-04)

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FEE TRANSMITTAL

For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27**TOTAL AMOUNT OF PAYMENT (\$)** 500.00**Complete if Known**

Application Number	10/799,413
Filing Date	03/12/2004
First Named Inventor	Angela Hui
Examiner Name	Anh D. Mai
Art Unit	2814
Attorney Docket No.	AF01158

METHOD OF PAYMENT (check all that apply)☐ Check ☐ Credit Card ☐ Money Order☒ Deposit Account ☐ None

Deposit Account Number: 01-0365
Deposit Account Name: Advanced Micro Devices, Inc.

The Director is hereby authorized to: (check all that apply)

- ☒ Charge fee(s) indicated below
☐ Charge fee(s) indicated below, except for the filing fee
☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17
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☐ Other (please identify):**WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**FEE CALCULATION****1. BASIC FILING FEE**

Fee Description	Fee (\$)	Small Entity Fee (\$)	Fee Paid (\$)
Utility Filing Fee	790	395	
Design Filing Fee	350	175	
Plant Filing Fee	550	275	
Reissue Filing Fee	790	395	
Provisional Filing Fee	160	80	

Subtotal (1) \$**FEE CALCULATION** (continued)**2. EXTRA CLAIM FEES**

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20	50	25
Each independent claim over 3	200	100
Multiple dependent claims	360	180
For Reissues, each claim over 20 and more than in the original patent	50	25
For Reissues, each independent claim more than in the original patent	200	100

Total Claims **Extra Claims** **Fee (\$)** **Fee Paid (\$)**
_____ - 20 or HP = _____ x _____ = _____
HP = highest number of total claims paid for, if greater than 20

Indep. Claims **Extra Claims** **Fee (\$)** **Fee Paid (\$)**
_____ - 3 or HP = _____ x _____ = _____
HP = highest number of independent claims paid for, if greater than 3

Multiple Dependent Claims **Fee (\$)** **Fee Paid (\$)**

Subtotal (2) \$**3. OTHER FEES**

Fee Description	Fee (\$)	Small Entity Fee (\$)	Fee Paid (\$)
1-month extension of time	120	60	
2-month extension of time	450	225	
3-month extension of time	1,020	510	
4-month extension of time	1,590	795	
5-month extension of time	2,160	1,080	
Information disclosure stmt. fee	180	180	
37 CFR 1.17(q) processing fee	50	50	
Non-English specification	130	130	
Notice of Appeal	500	250	
Filing a brief in support of appeal	500	250	500
Request for oral hearing	1,000	500	

Other: _____

Subtotal (3) \$ 500**SUBMITTED BY**

Signature		Registration No. (Attorney/Agent)	47.159	Telephone	512.370.2832
Name (Print/Type)	Robert A. Voigt, Jr.	Date	01/24/2006		

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AF01158



PATENT

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application: Hui et al.

Serial No.: 10/799,413

Filed: March 12, 2004

Art Unit: 2814

Examiner: Mai, Anh D.

Title: AVOIDING FIELD OXIDE GOUGING IN SHALLOW TRENCH ISOLATION (STI) REGIONS

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I. **REAL PARTY IN INTEREST**

The real party in interest is Advanced Micro Devices, Inc., which is the assignee of the entire right, title and interest in the above-identified patent application.

CERTIFICATION UNDER 37 C.F.R. §1.8

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Toni Stanley

(Printed name of person certifying)

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II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, Appellants' legal representative or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-5 and 10-15 are pending in the Application. Claims 1-5 and 10-15 stand rejected. Claims 1-5 and 10-15 are appealed.

IV. STATUS OF AMENDMENTS

Appellants have not submitted any amendments following receipt of the final rejection with a mailing date of October 18, 2005.

V. SUMMARY OF CLAIMED SUBJECT MATTER

In one embodiment of the present invention, a method for avoiding oxide gouging in shallow trench isolation (STI) regions of a semiconductor device may comprise the step of etching a trench in an STI region. Specification, page 7, lines 17-19; Figure 2, step 201. The method may further comprise filling the trench with an insulating material. Specification, page 7, lines 19-20; Figure 2, step 202. The method may further comprise forming a gate oxide layer overlying the STI region and extending beyond the boundaries of the STI region. Specification, page 7, lines 21-23; Figure 2, step 203; Figure 3A. The method may further comprise depositing a polysilicon layer over the gate oxide layer. Specification, page 7, lines 24-25; Figure 2, step 204; Figure 3A. The method may further comprise depositing an anti-reflective coating layer over the polysilicon layer. Specification, page 7, lines 25-26; Figure 2, step 205; Figure 3A. The method may further comprise etching a portion of the anti-reflective coating layer over the STI region leaving a remaining portion of the

anti-reflective coating layer over the STI region and extending beyond the boundaries of the STI region. Specification, page 8, lines 1-3; Figure 2, step 207; Figure 3B. The method may further comprise etching an exposed portion of the polysilicon layer and the gate oxide layer over the STI region leaving a remaining portion of the polysilicon layer and the gate oxide layer over the STI region and extending beyond the boundaries of the STI region. Specification, page 8, lines 5-7; Figure 2, step 208; Figure 3C. The method may further comprise depositing a protective cap over the STI region and extending beyond the boundaries of the STI region, where the protective cap covers the remaining portion of the anti-reflective coating layer over the STI region and covers the insulating material over the STI region. Specification, page 8, lines 11-18; Figure 2, step 210; Figure 3E. The method may further comprise etching a portion of the protective cap to expose the remaining portion of the anti-reflective coating layer while maintaining protection of the insulating material. Specification, page 8, lines 20-27; Figure 2, step 211; Figure 3F. The method may further comprise etching the remaining portion of the anti-reflective coating layer, where the insulating material is protected during etching of the remaining portion of the anti-reflective coating layer by the protective cap. Specification, page 9, lines 1-7; Figure 2, step 212; Figure 3G.

In another embodiment of the present invention, a method for avoiding oxide gouging in shallow trench isolation (STI) regions of a semiconductor device may comprise the step of etching a trench in an STI region. Specification, page 7, lines 17-19; Figure 2, step 201. The method may further comprise filling the trench with an insulating material. Specification, page 7, lines 19-20; Figure 2, step 202. The method may further comprise depositing an anti-reflective coating layer over the STI region and extending beyond the boundaries of the STI region. Specification, page 7, lines 25-26; Figure 2, step 205; Figure 3A. The method may further comprise etching a portion of the anti-reflective coating layer over the STI region leaving a remaining portion of the anti-reflective coating layer over the STI region and extending beyond

the boundaries of the STI region. Specification, page 8, lines 1-3; Figure 2, step 207; Figure 3B. The method may further comprise depositing a protective cap covering the STI region and extending beyond the boundaries of the STI region, where the protective cap covers the remaining portion of the anti-reflective coating layer and the insulating material over the STI region. Specification, page 8, lines 11-18; Figure 2, step 210; Figure 3E.

VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-5 and 10-15 stand rejected under 35 U.S.C. §112, second paragraph. Claims 10, 11, 14 and 15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hsu et al. (U.S. Patent No. 6,197,637) (hereinafter "Hsu") in view of Yang et al. (U.S. Patent No. 6,110,779) (hereinafter "Yang"). Claims 12 and 13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hsu in view of Yang and in further view of Tripsas et al. (U.S. Patent No. 6,034,395) (hereinafter "Tripsas").

VII. ARGUMENT

A. Claims 1-5 and 10-15 are improperly rejected under 35 U.S.C. §112, second paragraph.

The Examiner rejects claims 1-5 and 10-15 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Paper No. 7, page 2. In particular, the Examiner states:

Claim 1, lines 9-11, recites: 'etching a portion of said anti-reflective coating layer over said STI region leaving a remaining portion of said anti-reflective coating layer over said STI region and extending beyond the boundaries of said STI region.' How can etching a portion of anti-reflective coating that lies over the STI region and still leaving

the remaining portion of ARC over the STI? The claims must meet the threshold requirement of clarity and precision (MPEP 2173.02). Accordingly, as recited in claim 1, the anti-reflective coating layer are fully exposed therefore, 'etching a portion of said anti-reflective coating layer' would remove the anti-reflective coating layer as a whole. Once removed, the ARC is no longer situated [sic] over the STI, however, the limitation seems to indicate [sic] that nothing is removed or at most a top portion is removed. Paper No. 7, pages 2-3.

Appellants respectfully contend that the scope of the claimed subject matter in claims 1-5 and 10-15 can be determined by one having ordinary skill in the art. In particular, Appellants respectfully contend that the limitation of "etching a portion of said anti-reflective coating layer over said STI region leaving a remaining portion of said anti-reflective coating layer over said STI region and extending beyond the boundaries of said STI region" as recited in claim 1 and similarly in claim 10 can be determined by one having ordinary skill in the art. Appellants respectfully direct the Board's attention to at least page 8, lines 1-3 of the Specification and Figure 3B as illustrating the etching of a portion of the anti-reflective coating layer over the STI region and leaving a remaining portion of the anti-reflective coating layer over the STI region and extending beyond the boundaries of the STI region. As illustrated in Figure 3B, a portion of the anti-reflective coating layer 34 was etched over the STI region 14 leaving a remaining portion of the anti-reflective coating layer 34 over the STI region 14. Furthermore, Figure 3B illustrates that the anti-reflective coating layer 34 extends beyond the boundaries of the STI region 14. Consequently, the scope of the above-cited claimed subject matter can be determined by one having ordinary skill in the art. The above-cited claimed subject matter does meet the threshold requirement of clarity and precision. Hence, claims 1-5 and 10-15 are allowable under 35 U.S.C. §112, second paragraph.

Furthermore, the Examiner has not provided any evidence that a person of ordinary skill in the art would not be able to determine the scope of the above-cited claim limitation. A rejection under 35 U.S.C. §112, second paragraph, is not

appropriate, when the scope of the claimed subject matter can be determined by one having ordinary skill in the art. M.P.E.P. §706.03(d). As stated above, one having ordinary skill in the art can determine the scope of the claimed subject matter in claims 1-5 and 10-15. Consequently, Appellants respectfully assert that claims 1-5 and 10-15 are allowable under 35 U.S.C. §112, second paragraph.

Furthermore, the Examiner asserts that the above-cited claimed subject matter does not meet the threshold requirement of clarity and precision. Paper No. 7, page 2. According to M.P.E.P. §2173.02, the essential inquiry is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. M.P.E.P. §2173.02 further states that the definiteness of claim language must be analyzed, not in a vacuum, but in light of: the content of the particular application disclosure; the teachings of the prior art; and the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. The Examiner though has not analyzed the claim language in light of Appellants' application disclosure, the teachings of the prior art and the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. Instead, the Examiner is in essence analyzing the claim language in a vacuum and is rejecting claims 1-5 and 10-15 under 35 U.S.C. §112, second paragraph, simply because, in the Examiner's subjective opinion, the claim language is not as precise as the Examiner desires. This is improper. The Examiner has not appropriately analyzed the claim language for definiteness and, as a result, has improperly rejected claims 1-5 and 10-15 under 35 U.S.C. §112, second paragraph.

As evidence that the Examiner is analyzing the claim language in a vacuum, the Examiner makes the following statement:

Applicant states: respectfully direct the Examiner's attention to at least page 8, lines 1-3 of the specification and Figure 3B. (Page 15). The statement in itself clearly require the one having ordinary skill in the

art to review the specification for the missing element. Therefore, clarity and precision are clearly lacking. As clearly indicated that although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims...It is noted that the features upon which applicant relies...are not recited in the rejected claim(s). Paper No. 7, page 8.

Appellants respectfully traverse the Examiner's assertion that by Appellants pointing to a particular passage in the Specification as support for the claim language that Appellants are illustrating that the claim language lacks clarity and precision. Instead, the definiteness of claim language must be analyzed, not in a vacuum, but in light of the content of the particular application disclosure. M.P.E.P. §2173.02. Furthermore, Appellants are not reading any limitations from the Specification into the claims. Neither are Appellants relying on features not recited in the rejected claims in order to show that a person of ordinary skill in the art would be able to determine the scope of the claimed subject matter. The Examiner has improperly rejected claims 1-5 and 10-15 under 35 U.S.C. §112, second paragraph.

The Examiner continues by stating:

Similarly, lines 12-14 recites: 'etching an exposed portion of said polysilicon layer said gate oxide layer over said STI region leaving a remaining portion of said polysilicon layer and said gate oxide layer over said STI region and extending beyond the boundaries of said STI region'. Paper No. 7, page 3.

Appellants respectfully contend that the scope of the claimed subject matter in claims 1-5 and 10-15 can be determined by one having ordinary skill in the art. In particular, Appellants respectfully contend that the limitation of "etching an exposed portion of said polysilicon layer and said gate oxide layer over said STI region leaving a remaining portion of said polysilicon layer and said gate oxide layer over said STI region and extending beyond the boundaries of said STI region" as recited in claim 1 and similarly in claim 10 can be determined by one having ordinary skill in the art. Appellants respectfully direct the Board's attention to at least page 8, lines 5-7 of the

Specification and Figures 3B and 3C as illustrating the etching of an exposed portion of the polysilicon layer and the gate oxide layer over the STI region leaving a remaining portion of the polysilicon layer and the gate oxide layer over the STI region and extending beyond the boundaries of the STI region. As illustrated in Figure 3B, a portion of the polysilicon layer 32 and the gate oxide layer 34 is exposed over the STI region 14 as a result of etching anti-reflective coating layer 34 over a portion of the STI region 14. Further, as illustrated in Figure 3C, the exposed portion of the polysilicon layer 32 and the gate oxide layer 34 over the STI region 14 is etched leaving a remaining portion of the polysilicon layer 32 and the gate oxide layer 34 over the STI region 14. Furthermore, Figure 3C illustrates that the polysilicon layer 32 and the gate oxide layer 34 extends beyond the boundaries of the STI region 14. Consequently, the scope of the above-cited claimed subject matter can be determined by one having ordinary skill in the art. Hence, claims 1-5 and 10-15 are allowable under 35 U.S.C. §112, second paragraph.

Furthermore, the Examiner has not provided any evidence that a person of ordinary skill in the art would not be able to determine the scope of the above-cited claim limitation. A rejection under 35 U.S.C. §112, second paragraph, is not appropriate, when the scope of the claimed subject matter can be determined by one having ordinary skill in the art. M.P.E.P. § 706.03(d). As stated above, one having ordinary skill in the art can determine the scope of the claimed subject matter in claims 1-5 and 10-15. Consequently, Appellants respectfully assert that claims 1-5 and 10-15 are allowable under 35 U.S.C. §112, second paragraph.

Furthermore, the Examiner states:

Claim 1 recites the limitation 'etching an exposed portion of said polysilicon layer and said gate oxide layer over said STI region' in lines 12-13. This is insufficient antecedent basis for this limitation in the claim. Paper No. 7, page 3.

Appellants respectfully traverse. The phrase "exposed portion" is preceded by an "an" and not a "said". Hence, "an exposed portion" has not been previously recited in claim 1. Appellants are confused as to how "an exposed portion" lacks sufficient antecedent basis.

The Examiner further states:

Neither the polysilicon nor the gate oxide have been exposed, because the anti-reflective coating layer is still remaining over the STI region and extending beyond the boundaries of the STI region (See lines 9-11). Paper No. 7, page 3.

Appellants are assuming that the Examiner is rejecting claim 1 under 35 U.S.C. §112, second paragraph, because the Examiner alleges that the Specification does not provide a sufficient description of the limitation "etching an exposed portion of said polysilicon layer and said gate oxide layer over said STI region" as recited in claim 1. Appellants respectfully traverse.

Appellants respectfully contend that the scope of the claimed subject matter in claims 1-5 can be determined by one having ordinary skill in the art. In particular, Appellants respectfully contend that the limitation of "etching an exposed portion of said polysilicon layer and said gate oxide layer over said STI region" as recited in claim 1 can be determined by one having ordinary skill in the art. Appellants respectfully direct the Board's attention to at least page 8, lines 1-7 of the Specification and Figures 3B and 3C as illustrating the etching of an exposed portion of the polysilicon layer and the gate oxide layer over the STI region. As illustrated in Figure 3B, a portion of the polysilicon layer 32 and the gate oxide layer 34 is exposed over the STI region 14 as a result of etching anti-reflective coating layer 34 over a portion of the STI region 14. Further, as illustrated in Figure 3C, the exposed portion of the polysilicon layer 32 and the gate oxide layer 34 over the STI region 14 is etched leaving a remaining portion of the polysilicon layer 32 and the gate oxide layer 34 over the STI region 14. Consequently, the scope of the above-cited claimed

subject matter can be determined by one having ordinary skill in the art. Hence, claims 1-5 are allowable under 35 U.S.C. §112, second paragraph.

Furthermore, the Examiner has not provided any evidence that a person of ordinary skill in the art would not be able to determine the scope of the above-cited claim limitation. A rejection under 35 U.S.C. §112, second paragraph, is not appropriate, when the scope of the claimed subject matter can be determined by one having ordinary skill in the art. M.P.E.P. § 706.03(d). As stated above, one having ordinary skill in the art can determine the scope of the claimed subject matter in claims 1-5. Consequently, Appellants respectfully assert that claims 1-5 are allowable under 35 U.S.C. §112, second paragraph.

B. Claims 10, 11, 14 and 15 are improperly rejected under 35 U.S.C. §103(a) as being unpatentable over Hsu in view of Yang.

The Examiner has rejected claims 10, 11, 14 and 15 under 35 U.S.C. §103(a) as being unpatentable over Hsu in view of Yang. Paper No. 7, page 4. Appellants respectfully traverse for at least the reasons stated below.

1. Hsu and Yang, taken singly or in combination, do not teach or suggest the following claim limitations.
 - a. Claim 10 is patentable over Hsu in view of Yang

Appellants respectfully assert that Hsu and Yang, taken singly or in combination, do not teach or suggest "etching a trench in an STI region; filling said trench with an insulating material" as recited in claim 10. The Examiner cites element 76 and Figure 4 as teaching the above-cited claim limitations. Paper No. 7, page 5. Appellants respectfully traverse and assert that Yang instead teaches that although Figure 3C discloses the isolation regions 14a and 14b as field oxidation regions, the structure may alternatively use trench isolation structures 76, as shown in Figure 4. Column 6, lines 24-26. There is no language in Yang that teaches etching a

trench in a shallow trench isolation region. Appellants have performed a search of the term "STI" and was unable to identify this term or any variation thereof. Appellants further performed a search in Yang of the phrase "shallow trench" and were unable to identify this phrase or any variation thereof. Further, there is no language in the description of Figure 4 that teaches filling the trench (Examiner asserts that element 76 teaches the trench claimed) with an insulating material. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 10, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Appellants further assert that Hsu and Yang, taken singly or in combination, do not teach or suggest "depositing an anti-reflective coating layer over said STI region and extending beyond the boundaries of said STI region" as recited in claim 10. The Examiner cites element 241a of Hsu as teaching an anti-reflective coating. Paper No. 7, page 4. The Examiner though does not cite an element in Hsu as teaching an STI region. In order to establish a *prima facie* case of obviousness, the Examiner must cite a reference or combination of references that teaches or suggests all of the claim limitations. M.P.E.P. §2142. Since the Examiner has not cited a passage in Hsu or in combination with Yang as teaching the above-cited claim limitation, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 10. M.P.E.P. §2143.

Appellants further assert that Hsu and Yang, taken singly or in combination, do not teach or suggest "etching a portion of said anti-reflective coating layer over said STI region leaving a remaining portion of said anti-reflective coating layer over said STI region and extending beyond the boundaries of said STI region" as recited in claim 10. The Examiner cites elements 241a and 242 of Hsu as teaching the above-cited claim limitation. Paper No. 7, page 5. Appellants respectfully traverse and assert that Hsu instead teaches that a conducting layer (element 240a) and an

insulating layer (element 241a) are sequentially formed over the semiconductor substrate (element 210). Column 3, lines 41-43. Hsu further teaches depositing a silicon nitride layer on the insulating layer (element 241a). Column 3, lines 45-47. Hsu further teaches that through exposure and photolithography processes, a patterned photoresist and an opening (element 242) exposing a portion of the surface of the silicon nitride layer are formed. Column 3, lines 48-51. Hence, Hsu teaches exposing a portion of the silicon nitride layer deposited on the insulating layer. Figure 5B of Hsu illustrates that opening 242, as taught by Hsu, does not include exposing a portion of insulating layer 241a. Thus, there is no language in Hsu that teaches etching a portion of an anti-reflective coating layer (Examiner asserts that element 241a of Hsu teaches an anti-reflective coating layer). Neither is there any language in Hsu that teaches etching a portion of an anti-reflective coating layer over an STI region. Neither is there any language in Hsu that teaches etching a portion of an anti-reflective coating layer over an STI region leaving a remaining portion of the anti-reflective coating layer over the STI region. Neither is there any language in Hsu that teaches etching a portion of an anti-reflective coating layer over an STI region leaving a remaining portion of the anti-reflective coating layer over the STI region and extending beyond the boundaries of the STI region. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 10, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Appellants further assert that Hsu and Yang, taken singly or in combination, do not teach or suggest "depositing a protective cap covering said STI region and extending beyond the boundaries of said STI region, wherein said protective cap covers said remaining portion of said anti-reflective coating layer and said insulating material over said STI region" as recited in claim 10. The Examiner cites element 230 as teaching both an STI region and an insulating material. Paper No. 7, page 5. Appellants respectfully traverse. Appellants use both the term "STI region" and the

term "insulating material" in claim 10 and hence, under the rule of claim differentiation, each term must mean something different. The Examiner cannot cite the same element in Hsu as teaching two different elements. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 10, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

- b. Claims 11 and 14-15 are patentable over Hsu in view of Yang since claim 10 is patentable over Hsu in view of Yang.

Claims 11 and 14-15 depend from claim 10 and hence are patentable over Hsu in view of Yang for at least the reasons stated in Section B.1.a.

- c. Claim 11 is patentable over Hsu in view of Yang.

Appellants respectfully assert that Hsu and Yang, taken singly or in combination, do not teach or suggest "etching a portion of said protective cap to expose said remaining portion of said anti-reflective coating layer while maintaining protection of said insulating material" as recited in claim 11. The Examiner cites element 246 of Hsu as teaching a protective cap; element 241a of Hsu as teaching an anti-reflective coating layer and element 230 of Hsu as teaching an insulating material. Paper No. 7, page 6. The Examiner further cites Figures 5C-E of Hsu as teaching the above-cited claim limitation. Paper No. 7, page 6. Appellants respectfully traverse.

Hsu instead teaches that the planarization process is utilized to remove the insulating layer (element 246 which the Examiner asserts as teaching a protective cap) to the surface of the insulating layer (element 241). Column 4, lines 5-7. Hsu further teaches that the remainder of the insulating layer (element 247) is left within the opening (element 244). Column 4, lines 7-8. Hsu further teaches that for

example, a chemical mechanical polishing process is utilized to polish the oxide layer (element 246) to the surface of the cap nitride layer (element 241). Column 4, lines 8-10. Hence, Hsu teaches removing the entire and not just a portion of the insulating layer (element 246 which the Examiner asserts as teaching a protective cap) as illustrated in Figure 5D. Thus, Hsu does not teach etching a portion of a protective cap.

Neither does Hsu teach etching a portion of the protective cap to expose a remaining portion of an anti-reflective coating layer. The Examiner had cited element 241a as teaching an anti-reflective coating layer. However, there is no element 241a in Figures 5C-E which the Examiner cites as teaching the above-cited claim limitation.

Neither does Hsu teach etching a portion of the protective cap to expose a remaining portion of an anti-reflective coating layer while maintaining protection of an insulating material. The Examiner has cited element 230 of Hsu as teaching an insulating material. However, the Examiner has previously cited element 230 of Hsu as teaching an isolation region (Appellants assume the Examiner was referring to the STI region as claimed in claim 10). Paper No. 7, page 6. Appellants use both the term "STI region" and the term "insulating material" in claim 10 and hence, under the rule of claim differentiation, each term must mean something different. The Examiner cannot cite the same element in Hsu as teaching two different elements.

Thus, as a result of the foregoing, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 11, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Appellants further assert that Hsu and Yang, taken singly or in combination, do not teach or suggest "etching said remaining portion of said anti-reflective coating

layer" as recited in claim 11. The Examiner cites element 241 of Hsu as teaching a remaining portion and element 241a of Hsu as teaching an anti-reflective coating layer. Paper No. 7, page 6. Appellants respectfully traverse.

Hsu instead teaches that the conducting layer 240a and the insulating layer 241a are defined to form a floating gate 240 on the active region 200 and a cap layer 241 on the floating gate. Column 3, lines 52-55. Hsu further teaches an etching protection layer 245 is conformally formed extending from the isolation structure 230 within the opening 244 up to the cap layer 241. Column 3, lines 56-59. There is no language in Hsu that teaches etching element 241a (which the Examiner asserts as teaching an anti-reflective coating layer). Instead, Hsu teaches that the insulating layer 241a and the conducting layer 240a are defined to form a floating gate 240 on the active region 200 and a cap layer 241 on the floating gate. Furthermore, there is no language in Hsu that teaches etching a remaining portion of an anti-reflective coating layer. Appellants respectfully assert that there does not appear to be a connection between element 241 of Hsu and a remaining portion of an anti-reflective coating layer. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 11, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Appellants further assert that Hsu and Yang, taken singly or in combination, do not teach or suggest "wherein said insulating material is protected during etching of said remaining portion of said anti-reflective coating layer by said protective cap" as recited in claim 11. The Examiner cites element 230 of Hsu as teaching an insulating material; element 241 of Hsu as teaching a remaining portion; element 241a of Hsu as teaching an anti-reflective coating layer; and element 247 of Hsu as teaching a protective cap. Paper No. 7, page 6. Appellants respectfully traverse.

As stated above, the Examiner has previously cited element 230 of Hsu as teaching an isolation region (Appellants assume the Examiner was referring to the STI region as claimed in claim 10). Paper No. 7, page 6. Appellants use both the term "STI region" and the term "insulating material" in claim 10 and hence, under the rule of claim differentiation, each term must mean something different. The Examiner cannot cite the same element in Hsu as teaching two different elements. Hence, Hsu does not teach protecting an insulating material.

Further, as stated above, there is no language in Hsu that teaches etching a remaining portion of an anti-reflective coating layer. Appellants respectfully assert that there does not appear to be a connection between element 241 of Hsu and a remaining portion of an anti-reflective coating layer. Appellants had previously requested the Examiner to more clearly explain the connection between the citation of element 241 of Hsu and a remaining portion of an anti-reflective coating layer pursuant to 37 C.F.R. §1.104(c)(2). The Examiner has ignored such a request.

Further, Hsu instead teaches that the planarization process is utilized to remove the insulating layer 246 to the surface of the insulating layer 241. Column 4, lines 5-7. Hsu further teaches that the remainder of the insulating layer 247 is left within the opening 244. Column 4, lines 7-8. Hsu further teaches that for example, a chemical mechanical polishing process is utilized to polish the oxide layer 246 to the surface of the cap nitride layer 241. Column 4, lines 8-10. Hsu further teaches that the remainder of the oxide layer 247 is left within the opening 244. Column 4, lines 10-12. Hence, Hsu teaches that element 247 corresponds to oxide that is left within an opening. There is no language in Hsu that element 247 (Examiner asserts as teaching a protective cap) protects element 230, which the Examiner asserts as teaching an insulating material. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 11, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d

1453, 1455 (Fed. Cir. 1998).

- d. Claims 14 and 15 are patentable over Hsu in view of Yang.

Appellants respectfully assert that Hsu and Yang, taken singly or in combination, do not teach or suggest "wherein said remaining portion of said anti-reflective coating layer is etched using a plasma etch process" as recited in claim 14. Appellants further assert that Hsu and Yang, taken singly or in combination, do not teach or suggest "wherein said insulating material comprises thermal oxide" as recited in claim 15. The Examiner has not cited to any passage in either Hsu or Yang as teaching the above-cited claim limitations. In order to establish a *prima facie* case of obviousness, the Examiner must cite a reference or combination of references to teach or suggest all of the claim limitations. M.P.E.P. §2142. Since the Examiner has not cited to any passage in either Hsu or Yang as teaching the above-cited claim limitations, the Examiner has not established a *prima facie* case of obviousness in rejecting claims 14-15. M.P.E.P. §2143.

2. The Examiner has not provided any objective evidence or appropriate motivation for modifying Hsu with Yang.

Most if not all inventions arise from a combination of old elements. *See In re Rouffet*, 47 U.S.P.Q.2d 1453, 1457 (Fed. Cir. 1998). Obviousness is determined from the vantage point of a hypothetical person having ordinary skill in the art to which the patent pertains. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1457 (Fed. Cir. 1998). Therefore, an Examiner may often find every element of a claimed invention may often be found in the prior art. *Id.* However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. *See Id.* In order to establish a *prima facie* case of obviousness, the Examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited

prior art references for combination in the manner claimed. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1458 (Fed. Cir. 1998). That is, the Examiner must provide some suggestion or motivation, either in the references themselves, the knowledge of one of ordinary skill in the art, or, in some case, the nature of the problem to be solved, to modify the reference or to combine reference teachings. *See In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). Whether the Examiner relies on an express or an implicit showing, the Examiner must provide particular findings related thereto. *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000).

The Examiner admits that Hsu does not teach "etching a trench in an STI region; filling said trench with an insulating material" as recited in claim 10. Paper No. 7, page 5. The Examiner modifies Hsu with Yang to include this missing limitation "because STI can be formed with narrow profile and devoid of bird's beak, hence more active surface area, thus more devices can be formed on a given semiconductor surface (ULSI)." Paper No. 7, page 5. As understood by Appellants, the Examiner is citing pages 45-47 of Wolf, *Silicon Processing for the VLSI Era* (hereinafter "Wolf") as support for the Examiner's motivation. Paper No. 7, page 8. The Examiner's motivation is insufficient to establish a *prima facie* case of obviousness for at least the reasons stated below.

Appellants are confused as to why the Examiner is citing to Wolf when the Examiner is relying upon Yang to modify Hsu. While motivation may be found in a reference, the reference is one of the references used in rejecting the claim(s) under an obviousness rejection. M.P.E.P. §2143. Hence, if the Examiner is asserting that the motivation to modify Hsu, as discussed above, is found in a reference, the Examiner must cite to a passage in either Hsu or Yang as the source for the motivation. M.P.E.P. §2143. Hence, the Examiner's motivation is insufficient to establish a *prima facie* case of obviousness in rejecting claims 10-15. M.P.E.P. §2143.

The Examiner's motivation ("because STI can be formed with narrow profile and devoid of bird's beak, hence more active surface area, thus more devices can be formed on a given semiconductor surface (ULSI) [sic]") does not provide reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would modify Hsu to include the above-cited missing claim limitations from claim 10. According, the Examiner has not presented a *prima facie* case of obviousness for rejecting claims 10-15. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1458 (Fed. Cir. 1998).

Hsu addresses the problem of overcoming the complicated and difficult to control process in improving the gate coupling ratio of a non-volatile memory cell. Column 2, lines 18-28. The Examiner has not provided any reasons as to why one skilled in the art would modify Hsu, which teaches fabricating a non-volatile memory cell overcoming the problem of using a complicated and difficult to control process in improving the gate coupling ratio (column 2, lines 31-34), to etch a trench in an STI region and fill the trench with an insulating material (Examiner admits that Hsu does not teach this limitation). The passage cited by the Examiner (pages 45-47 of Wolf) to support his motivation teaches while the buried-oxide (BOX) isolation technology that uses shallow trenches makes the process less difficult to develop than the deep-trench etch process, the shallow trenches area also much less effective in preventing latchup and isolating n-channel from p-channel devices in CMOS. Page 45. Wolf further teaches that using shallow trenches (0.5-0.8 μm deep) has the advantages of eliminating the bird's beak of LOCOS and of providing a planar surface. Page 45. Hsu does not teach the use of LOCOS and hence does not need to eliminate a bird's beak of LOCOS. Hence, Wolf does not provide reasoning to modify Hsu as discussed above. The Examiner must provide objective evidence in modifying Hsu to include the above-cited missing limitations of claim 10. *In re Lee*, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002). Instead, the Examiner is merely relying upon his own

subjective opinion which is insufficient to support a *prima facie* case of obviousness in rejecting claims 10-15. *Id.* Consequently, the Examiner's motivation is insufficient to support a *prima facie* case of obviousness for rejecting claims 10-15. *Id.*

Furthermore, with respect to the Examiner's citing of Wolf, Appellants did not locate any language in Wolf that specifically stated that an advantage of eliminating the bird's beak of LOCOS was having more active surface area which results in more devices being formed on a given semiconductor surface. Hence, Wolf does not appear to provide support for the Examiner's motivation. In essence, the Examiner has not provided a source for the Examiner's motivation. The motivation to modify Hsu must come from one of three possible sources: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. *In re Rouffet*, 149 F.3d 1350, 1357, 47 U.S.P.Q.2d 1453, 1457-58 (Fed. Cir. 1998). The Examiner has not provided any evidence that his motivation comes from any of these sources. While the Examiner asserts that his motivation comes from the knowledge of a person of ordinary skill in the art (Paper No. 7, page 9), the Examiner must still provide evidence to support such an assertion. *In re Lee*, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002). Instead, the Examiner is relying upon his own subjective opinion which is insufficient to support a *prima facie* case of obviousness. *In re Lee*, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002). Consequently, the Examiner's motivation is insufficient to support a *prima facie* case of obviousness for rejecting claims 10-15. *Id.*

Furthermore, the Examiner cites to column 6, lines 24-26 of Yang. Paper No. 7, page 9. Appellants are unsure as to whether the Examiner is citing to this passage as support for his motivation or not. Assuming that the Examiner is citing to this passage to support his motivation, the cited passage does not support the motivation ("because STI can be formed with narrow profile and devoid of bird's beak, hence more active surface area, thus more devices can be formed on a given semiconductor

surface"). Instead, Yang teaches that the structure may alternatively use trench isolation structures 76, as shown in Figure 4. Column 6, lines 25-26. There is no language in the cited passage that teaches that an STI can be formed with a narrow profile and devoid of a bird's beak and hence there is more active surface to form more devices on a given semiconductor surface. Neither is there any language in the cited passage that provides motivation for modifying Hsu to etch a trench in an STI region and fill the trench with an insulating material (Examiner admits that Hsu does not teach this limitation). Accordingly, the Examiner's motivation is insufficient to support a *prima facie* case of obviousness for rejecting claims 10-15 since the Examiner is relying upon his own subjective opinion. *In re Lee*, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002).

C Claims 12 and 13 are improperly rejected under 35 U.S.C. §103(a) as being unpatentable over Hsu in view of Yang and in further view of Tripsas.

The Examiner has rejected claims 12 and 13 under 35 U.S.C. §103(a) as being unpatentable over Hsu in view of Yang and in further view of Tripsas. Paper No. 7, page 6. Appellants respectfully traverse for at least the reasons stated below.

1. Hsu, Yang and Tripsas, taken singly or in combination, do not teach or suggest the following claim limitations.

Appellants respectfully assert that Hsu, Yang and Tripsas, taken singly or in combination, do not teach or suggest "wherein said photoresist material has a thickness of about 800Å to 1200Å" as recited in claim 13. The Examiner cites element 40 of Tripsas as teaching a protective cap that includes photoresist material with a thickness of 600Å to 1100Å. Paper No. 7, page 7. However, the Examiner has not cited to any passage in Tripsas as evidence that element 40 has a thickness of 600Å to 1100Å. Upon review of Tripsas, Appellants could not locate any passage that indicates the thickness of element 40. Therefore, the Examiner has not presented

a *prima facie* case of obviousness in rejecting claim 13, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

2. The Examiner has not provided any source of motivation for modifying Hsu and Yang with Tripsas.

The Examiner admits that Hsu does not teach "wherein said protective cap comprises photoresist material" as recited in claim 12. Paper No. 7, page 6. The Examiner further admits that Hsu does not teach "wherein said photoresist material has a thickness of about 800Å to 1200Å" as recited in claim 13. Paper No. 7, page 7. The Examiner modifies Hsu and Yang with Tripsas to include the above-cited claim limitations "because the photoresist is deposited by spin-on, thus simplifies the process, hence more through put." Paper No. 7, page 7. The Examiner has not presented any source of motivation for modifying Hsu with Yang to include this missing limitation.

In order to support a *prima facie* case of obviousness, the Examiner must provide a source of motivation for modifying Hsu and Yang with Tripsas to include the above-stated missing limitations. M.P.E.P. §2142. The motivation to modify Hsu and Yang with Tripsas must come from one of three possible sources: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. *In re Rouffet*, 149 F.3d 1350, 1357, 47 U.S.P.Q.2d 1453, 1457-58 (Fed. Cir. 1998). The Examiner has not provided any evidence that his motivation comes from any of these sources. Instead, the Examiner is relying upon his own subjective opinion which is insufficient to support a *prima facie* case of obviousness. *In re Lee*, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002). Consequently, the Examiner's motivation is insufficient to support a *prima facie* case of obviousness for rejecting claims 12-13. *Id.*

3. The Examiner has not provided any objective evidence or appropriate motivation for modifying Hsu and Yang with Tripsas.

As stated above, in order to establish a *prima facie* case of obviousness, the Examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1458 (Fed. Cir. 1998). That is, the Examiner must provide some suggestion or motivation, either in the references themselves, the knowledge of one of ordinary skill in the art, or, in some case, the nature of the problem to be solved, to modify the reference or to combine reference teachings. *See In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). Whether the Examiner relies on an express or an implicit showing, the Examiner must provide particular findings related thereto. *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000).

As stated above, the Examiner admits that Hsu does not teach "wherein said protective cap comprises photoresist material" as recited in claim 12. Paper No. 7, page 6. The Examiner further admits that Hsu does not teach "wherein said photoresist material has a thickness of about 800Å to 1200Å" as recited in claim 13. Paper No. 7, page 7. The Examiner modifies Hsu and Yang with Tripsas to include the above-cited claim limitations "because the photoresist is deposited by spin-on, thus simplifies the process, hence more through put." Paper No. 7, page 7. The Examiner's motivation is insufficient to establish a *prima facie* case of obviousness for at least the reasons stated below.

The Examiner's motivation ("because the photoresist is deposited by spin-on, thus simplifies the process, hence more through put") does not provide reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would modify Hsu to include the above-cited

missing claim limitations from claims 12 and 13. According, the Examiner has not presented a *prima facie* case of obviousness for rejecting claims 12-13. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1458 (Fed. Cir. 1998).

Hsu addresses the problem of overcoming the complicated and difficult to control process in improving the gate coupling ratio of a non-volatile memory cell. Column 2, lines 18-28. The Examiner has not provided any reasons as to why one skilled in the art would modify Hsu, which teaches fabricating a non-volatile memory cell overcoming the problem of using a complicated and difficult to control process in improving the gate coupling ratio (column 2, lines 31-34), to have a protective cap that includes photoresist material, where the photoresist material has a thickness of about 800Å to 1200Å. The Examiner has not provided any connection between the Examiner's statement of motivation "because the photoresist is deposited by spin-on, thus simplifies the process, hence more through put" and modifying Hsu to have a protective cap that includes photoresist material, where the photoresist material has a thickness of about 800Å to 1200Å. That is, the Examiner has not explained what depositing photoresist by spin-on has to do with modifying Hsu to have a protective cap that includes photoresist material, where the photoresist material has a thickness of about 800Å to 1200Å. The Examiner must provide objective evidence in modifying Hsu to include the above-cited missing limitations of claims 12 and 13. *In re Lee*, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002). Instead, the Examiner is merely relying upon his own subjective opinion which is insufficient to support a *prima facie* case of obviousness in rejecting claims 12-13. *Id.* Consequently, the Examiner's motivation is insufficient to support a *prima facie* case of obviousness for rejecting claims 12-13. *Id.*

Furthermore, the Examiner states:

However, this is well known in the art: depositing material such as

oxide, nitride or oxynitride require machinery in a protective environment and the process is slow and costly. Depositing the photoresist material on the other hand is very simple and economical. In case of Tripsas, spin-on deposition is simple and cheap, some time very cheap by using an eye-drop and a spinner, hence spin-on. Since layer 246 of Hsu and layer 40 of Tripsas are used as sacrificial, thus, one having ordinary skill in the art would seek a simplest process and most economical way to do the same task. The choice is obvious. Paper No. 7, page 9.

Appellants do not understand how these statements show a motivation for modifying Hsu to have a protective cap that includes photoresist material, where the photoresist material has a thickness of about 800Å to 1200Å. The Examiner is simply relying upon his own subjective opinion, without providing any evidence to support his opinion, which is insufficient to support a *prima facie* case of obviousness in rejecting claims 12-13. *Id.* Consequently, the Examiner's motivation is insufficient to support a *prima facie* case of obviousness for rejecting claims 12-13. *Id.*

VIII. CONCLUSION

For the reasons noted above, the rejections of claims 1-5 and 10-15 are in error. Appellants respectfully request reversal of the rejections and allowance of claims 1-5 and 10-15.

Respectfully submitted,

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**CLAIMS APPENDIX**

1. A method for avoiding oxide gouging in shallow trench isolation (STI) regions of a semiconductor device comprising the steps of:

etching a trench in an STI region;

filling said trench with an insulating material;

forming a gate oxide layer overlying said STI region and extending beyond the boundaries of said STI region;

depositing a polysilicon layer over said gate oxide layer;

depositing an anti-reflective coating layer over said polysilicon layer;

etching a portion of said anti-reflective coating layer over said STI region leaving a remaining portion of said anti-reflective coating layer over said STI region and extending beyond the boundaries of said STI region;

etching an exposed portion of said polysilicon layer and said gate oxide layer over said STI region leaving a remaining portion of said polysilicon layer and said gate oxide layer over said STI region and extending beyond the boundaries of said STI region;

depositing a protective cap over said STI region and extending beyond the boundaries of said STI region, wherein said protective cap covers said remaining portion of said anti-reflective coating layer over said STI region and covers said insulating material over said STI region;

etching a portion of said protective cap to expose said remaining portion of said anti-reflective coating layer while maintaining protection of said insulating material; and

etching said remaining portion of said anti-reflective coating layer;

wherein said insulating material is protected during etching of said remaining portion of said anti-reflective coating layer by said protective cap.

2. The method as recited in claim 1, wherein said protective cap comprises photoresist material.

3. The method as recited in claim 2, wherein said photoresist material has a thickness of about 800Å to 1200Å.
4. The method as recited in claim 1, wherein said remaining portion of said anti-reflective coating layer is etched using a plasma etch process.
5. The method as recited in claim 1, wherein said insulating material comprises thermal oxide.
10. A method for avoiding oxide gouging in shallow trench isolation (STI) regions of a semiconductor device comprising the steps of:
 - etching a trench in an STI region;
 - filling said trench with an insulating material;
 - depositing an anti-reflective coating layer over said STI region and extending beyond the boundaries of said STI region;
 - etching a portion of said anti-reflective coating layer over said STI region leaving a remaining portion of said anti-reflective coating layer over said STI region and extending beyond the boundaries of said STI region; and
 - depositing a protective cap covering said STI region and extending beyond the boundaries of said STI region, wherein said protective cap covers said remaining portion of said anti-reflective coating layer and said insulating material over said STI region.
11. The method as recited in claim 10 further comprising the steps of:
 - etching a portion of said protective cap to expose said remaining portion of said anti-reflective coating layer while maintaining protection of said insulating material; and
 - etching said remaining portion of said anti-reflective coating layer;

wherein said insulating material is protected during etching of said remaining portion of said anti-reflective coating layer by said protective cap.

12. The method as recited in claim 10, wherein said protective cap comprises photoresist material.

13. The method as recited in claim 12, wherein said photoresist material has a thickness of about 800Å to 1200Å.

14. The method as recited in claim 11, wherein said remaining portion of said anti-reflective coating layer is etched using a plasma etch process.

15. The method as recited in claim 10, wherein said insulating material comprises thermal oxide.

EVIDENCE APPENDIX

No evidence was submitted pursuant to §§1.130, 1.131, or 1.132 of 37 C.F.R. or of any other evidence entered by the Examiner and relied upon by Appellants in the Appeal.

RELATED PROCEEDINGS APPENDIX

There are no related proceedings to the current proceeding.

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